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# Theorie-Palaver

Jan. 31, 2023 at 2 p.m.

Lorentz room (Staudingerweg 7, 5th floor)

Felix Kahlhöfer  
KIT

## **Freezing-in a hot bath: resonances, medium effects and phase transitions**

Given our detailed knowledge of the dark matter energy density in the present universe, it is of great interest to study its evolution at early times in order to understand the mechanism of dark matter production. A particularly intriguing scenario, known as freeze-in, is that dark matter particles have tiny couplings and never enter into equilibrium with the thermal bath of Standard Model particles. In this talk, I will discuss various technical challenges that arise in this scenario as a result of the high temperatures and densities in the early universe. Specifically, I will show how to consistently treat the spin statistics of relativistic quantum gases and how to accurately calculate dark matter production via the Higgs resonance. Finally, I will discuss the case of freeze-in with low reheating temperature, which may be testable through cosmological, astrophysical and laboratory observations.

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